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# LAYING and FINISHING HARDWOOD FLOORS

By  
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**DAVID WILLIAMS COMPANY, Publishers**  
14 - 16 Park Place, **NEW YORK**

1906

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## CHAPTER I.

### Preliminary Work.

The general demand for finely finished floors of hard or soft wood in modern residences has given rise to such a variety of tools and finishes designed for this special purpose that natural confusion arises as to the best tools, finishes or methods to employ in this highly important branch of trade.



Fig. 1.—Showing Manner of Scraping Floor.

The growing demand for the conveniences of the city residence in the homes of the smaller towns and the rural districts often brings the carpenter and the painter up against this sort of work, demanding methods of treatment with which they are unfamiliar, and many a good

job of floor has been spoiled or indifferently treated by otherwise good mechanics, simply because they lacked the knowledge or experience so essential to success.

It has been the fortune of the writer to have a somewhat extended experience in the better grades of modern floor finishing, and it is with the hope of affording some degree of general information to the craft that this discussion of the topic is undertaken.

For convenience in treatment the subject will be considered with reference to the following elements:

1. The carpenter.
2. The tools required.
3. The laying of the floor.
4. Preparation of the surface.
5. The painter's work.
6. Different varieties of finish.
7. Relative cost of floors and finishes.
8. Suggestions as to estimating.

Taking up the first phase of the subject, it may be stated that not every good carpenter can make a success of finishing floors; a peculiar degree of skill is required, of that sort which enables one to finish a surface as smooth and free from imperfections as fine furniture and to do this work under trying conditions and with sufficient rapidity to make it profitable. The hardest work about a building is to be found on a floor, and three days' continuous labor of this sort will give lame back, sore knees and a wire edge temper to any but a saintly character.

This is no place for a man who is lazy or grouchy. For the average sized room give us two good natured, active mechanics who can keep tools sharp and hustle, and they will usually work to a better advantage than a

greater number. The view Fig. 1 shows a team at work. If your carpenter cannot sharpen plane or scraper to a razor edge and cut a clean shaving every time the tool is put to the floor, better put him at another job. In addition to these qualifications it is highly important that the workman be endowed with grace sufficient to keep his

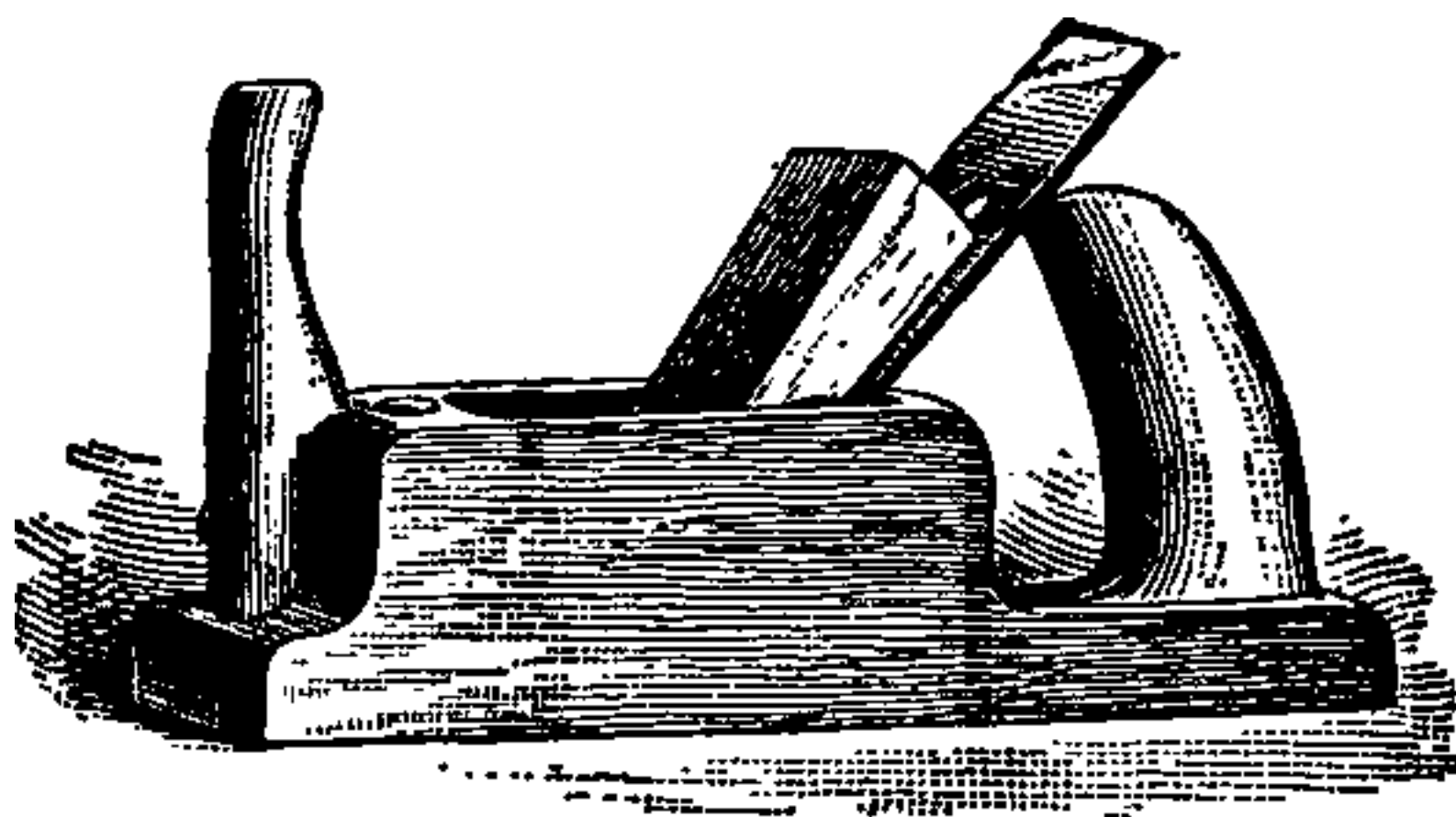


Fig. 2.—“Dutch” Plane with a Horn.

temper when freshly sharpened tools hit a grain of sand. Floor finishing requires a good eye, a delicate touch and a sense of pride in perfect workmanship. Often a floor which appears perfect to the eye will be wavy, and have imperfections which show up badly through the finish which inevitably magnifies all imper-

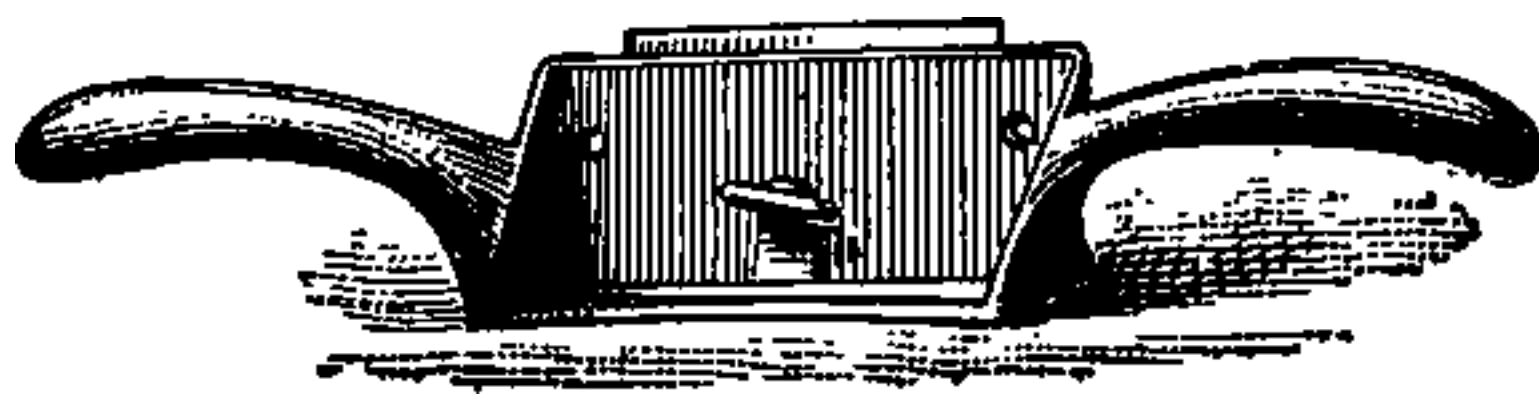


Fig. 3.—A Stanley No. 80 Scraper.

fections. These imperfections can be detected often by lightly passing the finger tips over the surface and may be quickly scraped out as they are felt. “Feel your floor” as you work it; when eye and finger tips both approve you will usually have a good job.



There is a legal maxim which runs to the effect that "he who seeks equity must come with clean hands." To this might be added the maxim that "he who seeks to do a good job of floor work must come with clean feet." Many a beautiful piece of scraping has been ruined by unsightly scratches made by the shoes of thoughtless workmen, and very often the same workmen who are doing the work.

Soft slippers or stocking feet are preferable when getting the floor ready for the painter. If you think you must wear shoes be sure that they are scrupulously clean and that all nails in heels and soles are filed down smooth to the leather. Some may think this counsel superfluous: "Any good mechanic should know that much;" well, possibly, but they don't all remember it out this way, and the hardest task we have is often to keep the floor clean for the painter after the carpenter is done.

Keep plenty of good, clean building paper handy, and use it liberally in covering the finished stretches of your floor; if likely to be walked over much put two or three thickness where the travel will be, and if the house be occupied let the boss carpenter be wise enough to "round up" the whole family and "shoe them" with a flat file until every nail is cleaned off which is likely to do damage.

If it is a new house put up the bars and keep all visitors and other workmen off the floors until the painter is through, else you are likely to have your labor doubled by the dirty feet of careless visitors.

Above all, be sure that you charge enough for the job, for the more you charge the more the owner will appreciate the value of your work and the more care he will take to see that your floor is not abused.

Before leaving this portion of the topic let me refer

in the most kindly spirit to another matter which is a legitimate subject for caution. A great many carpenters are unfortunately addicted to the tobacco chewing habit, and a goodly percentage of this number are careless about where they expectorate. It is very unpleasant for the owner of a building, and he usually makes it unpleasant for the contractor when his hot air registers are loaded up with tobacco quids and spittle left by the carpenter who finishes the floor. It is probable that a few readers of our readers would be guilty of such an indiscretion, but there are a lot of such fellows in Nebraska, and it is in the hope that this may meet their eye that this friendly word of caution is dropped.

There have been many tools devised for floor work, which are intended to reduce the labor to a minimum and make the job easy. I have never yet seen many of these which are successful. Of this sort are all long handled planes, sanders, etc., which are designed to be operated by the workman while in a standing position. Just as well understand, boys, that if you are to get a first-class job on that floor you must get right down next to it and put in the hard licks, relying on sharp tools and a willing disposition to get you out of it as speedily as possible. No intelligent mechanic would think of surfacing a casing or a finishing a table top with a plane attached to a handle 4 feet long; no more can you finish a floor with any of these makeshifts. This brings us to a brief consideration of the tools required.

Jack and smooth planes are indispensable in finishing pine floors, though most well milled hard wood floors may be satisfactorily finished with the scraper if the stock has been well smoothed by the sander before leaving the mill. Most of the manufacturers of high grade flooring now



give special attention to the surface finish of their product, and some of the material now on the market is a marvel of perfection in machine work. None is so perfect; however, as to dispense entirely with hand finishing, and nearly all lumber yard stock requires a lot of hard work to put it condition. There may be cases in which the smooth plane and sand paper will do the work, but plane marks will frequently show up on the surface, and it is safer to use the scraper freely. As to planes, every fellow has his favorite. Any plane is good that will do the work to the satisfaction of the user, but the writer confesses to a weakness for the old-fashioned Dutch plane with a "horn" on the front end. A home made tool of this kind, which is much more effective than handsome, is illustrated in Fig. 2.

This creation is the visible expression of a long felt desire for a plane that will "hug" the floor, run smooth, fit the hand and not "chatter" when a bit of hard grain is struck. In all these particulars it has proven a success. An ordinary 2-inch wooden jack plane was used to furnish the materials for it.

If partial to iron planes select one with a single cutter or a cutter without the ordinary cap which screws on to the bit. This precaution saves a deal of time in taking apart your plane for sharpening, and that's an operation which will be frequently necessary. The Siegley plane is one of the best types of this tool and not expensive.

The scraper must always be the mainstay for floor finishing as well as all other fine wood work. This tool is of such great variety and form as to deserve more than a passing notice, ranging from the common cabinet scraper to more complicated tools of every description.

One of the most common and universally used tools

of this type is the scraper plane, in form resembling the smooth plane and having a scraper blade fixed in the stock in lieu of the ordinary plane bit. Another widely used tool is the "Stanley No. 80," illustrated in Fig. 3 of the engravings.

Both the scraper plane and the "No. 80" are excellent tools in their place, but their place is not on the floor. Every carpenter knows that floor surfaces are more or less irregular and wavy and that while these irregularities are not so marked as to render it necessary to level the whole surface like a piece of plate glass, yet it is necessary to smooth up the joints and thoroughly clean the whole surface. The peculiar character of the cutting edge of the scraper (which will be studied in detail later

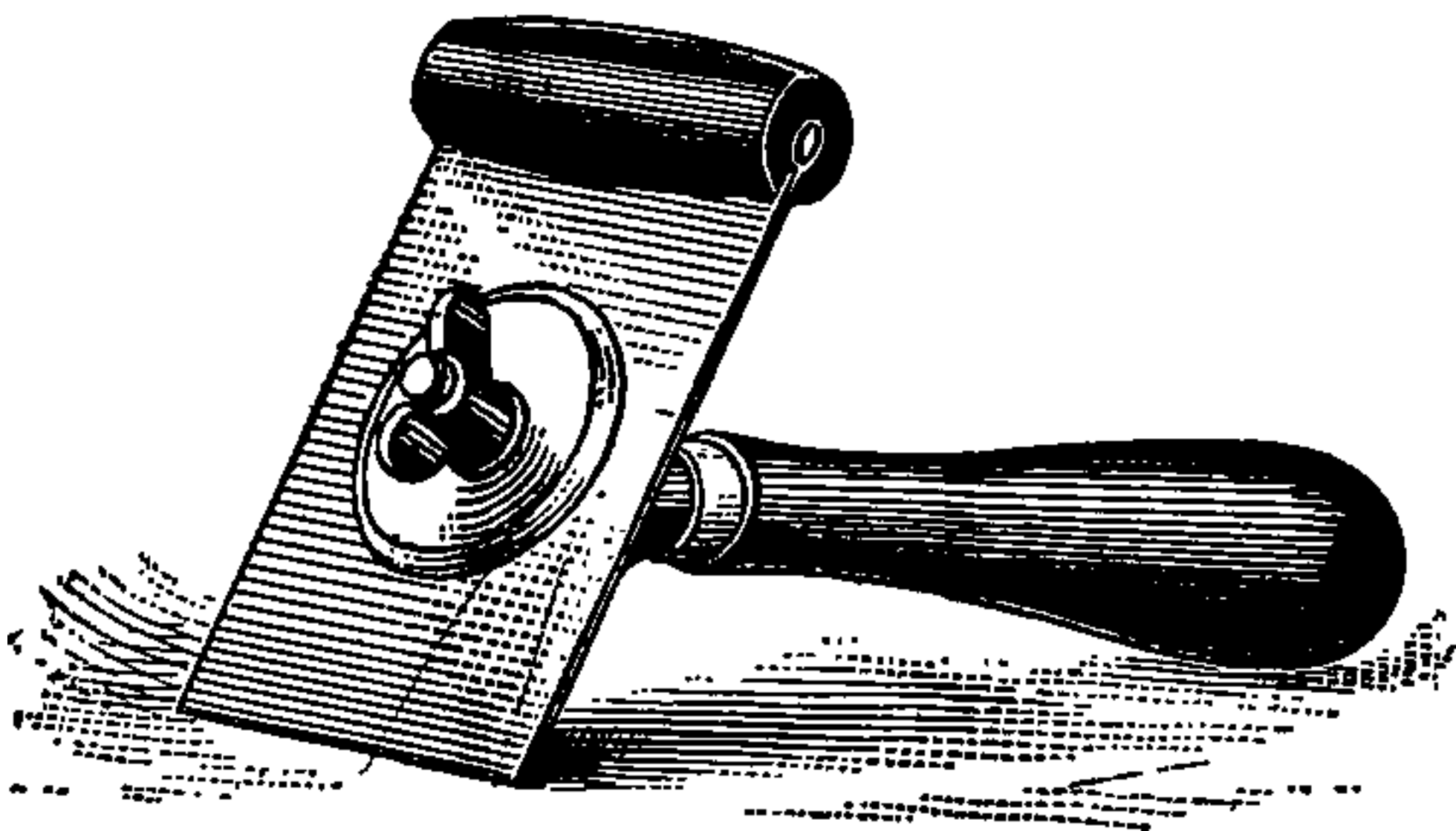


Fig. 4.—The Starrett "Universal" Scraper.

on) is such as to require constant change of angle and position in order to keep the tool cutting at its best without constant sharpening. The very strong "talking point" of the tools referred to—*i.e.*, the plane surface next to the floor serve as a guide to the tool and the rigid fastening of the scraper in the stock—are the two things which render these tools and all others of their class ineffective for floor work.

True that these tools are made susceptible of adjustment as to position of the cutter by shifting thumb screws, etc., but this takes too much time and experimenting before the proper position is secured to be of great value. That form of adjustment which is of most value will be the one which can be made automatically by the hands while the tool is in use.

Another defect of the tools under consideration is that they push instead of pull and cannot be worked up close to a corner or a baseboard.

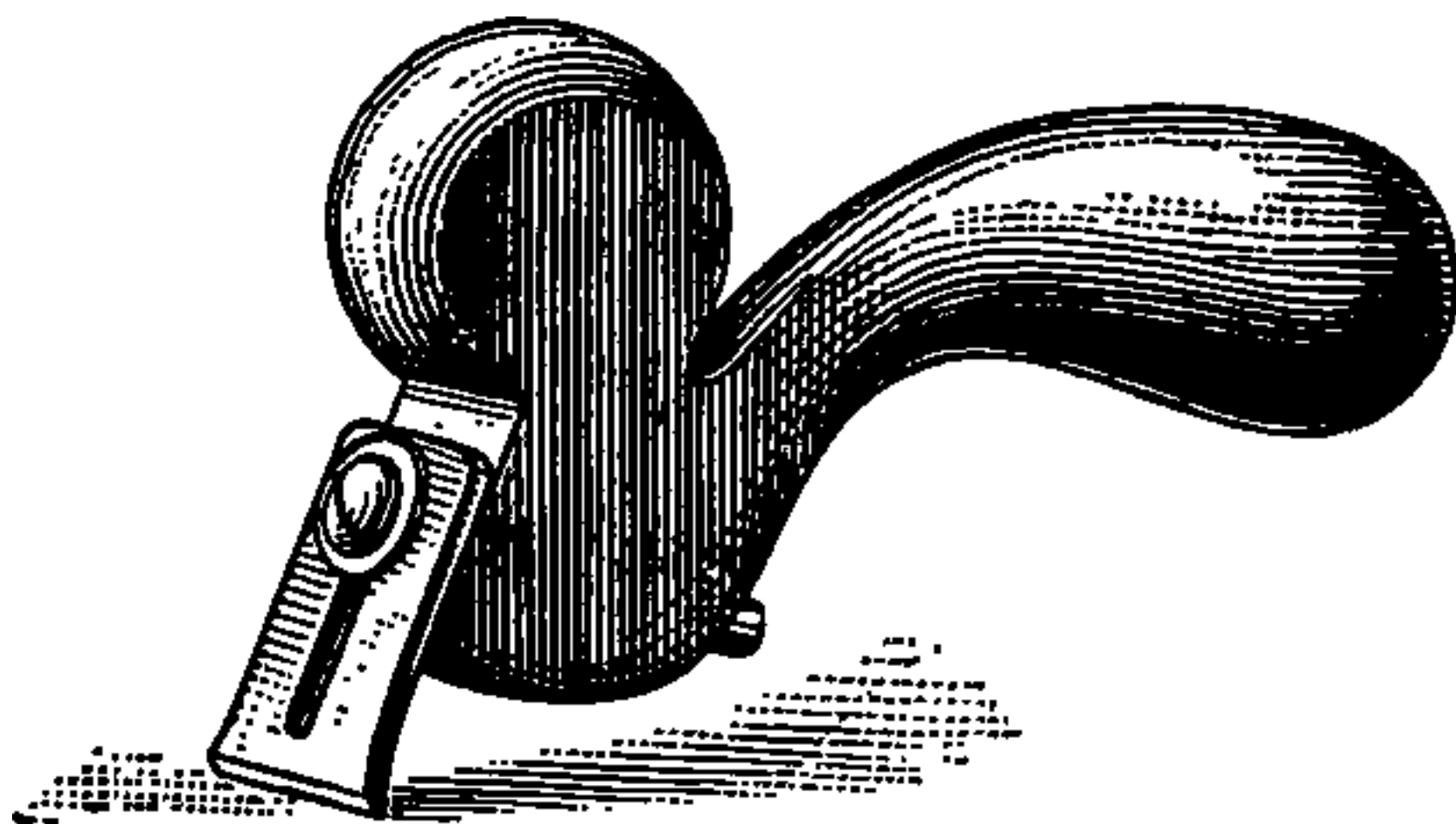


Fig. 5.—A Good Home Made Scraper.

I beg permission to say at this point that I have no interest in any tool manufacturing concern and no desire to give other than fair consideration to any and all tools offered to the trade for the purposes under consideration. The objections or criticisms which may appear in this article are frankly given as they have appeared to me or to workman in my employ in practical use of the tools under consideration, all of which have had a fair and practical test in actual service.

Most veneer planes, etc., are excellent tools for their special uses in cleaning veneered doors, cabinet work and general bench work in the shop, but they have no business on a floor, and the mechanic who buys them for this

purpose will waste his money and the time of his employer subsequently.

There is another class of scrapers equally good for floors or general wood work, which are equipped with a handle of convenient shape easily detachable from the scraper blade and adjustable to various angles as the case may require. These tools are generally designed to pull toward the operator and so devised that both hands may find convenient hold of the tool.

The chief criticism to be made on the various tools of this class now offered to the trade by tool manufacturers is that the scraper is generally made of too light gauge of steel and the handles bear every appearance of having been designed by some one who never pulled a scraper across a board.

One of the best and neatest tools of this type is the "Starrett Universal," shown in Fig. 4.



Fig. 6.—Burnishing or Sharpening Tool.

This tool is a marvel of cheapness when its quality is considered, and like all Starrett tools is so neat and convenient of adjustment that any mechanic should be glad to have one in his chest. The only criticisms I would offer against this tool are such as I frankly wrote the manufacturers some months since—viz.: that they strengthen the union of the wood handle with the ball and socket joint, provide a heavier blade and substitute a ball fastening containing a nut for the thumb screw which secures the blade to the handle. I understand that the tool has been modified or improved along the line of the

first two suggestions, but the thumb screw is still retained.

If the designer for the Starrett factory will spend thirty minutes on his knees in prayerful consideration of the needs of the craft and try for that length of time to use his "Universal Scraper" in actual work cleaning floors he will agree with me that the guard over the top however useful as a protection for the hand, is utterly useless as a hand hold for the left hand, and he will lose no time in putting on the ball fastener where the left hand can get firm grip directly on the center line of draft.

This tool could be further improved for floor work if the manufacturers would furnish a special blade of heavy steel—say, about 2 inches wide and  $\frac{3}{32}$  thick, with a beveled cutting edge. Such a blade would cut faster and more evenly and not heat quickly.

The need of such a tool as this led the writer some five years ago to design and make for his own use the floor scraper illustrated in Fig. 5, together with a convenient and easily made burnisher or sharpening tool, Fig. 6.

This tool is so obviously simple as to require little explanation or comment. It fits both hands, is easily adjustable to any position by a simple and automatic shifting of the position of the hand, will cut anywhere that any scraper will and some places that no other will, and can be easily and quickly made by any carpenter at a cost of but a few minutes' labor. As shown it is equipped with  $1\frac{3}{4}$ -inch blade as in actual use on a floor. It will take any flooring that runs decently even, and in the hands of a man who is not afraid to work will clean and finish without the use of a plane or other tool more square feet of floor than any tool that I have ever seen. While



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the blade is slotted so as to permit quick removal, not the least of the advantages of this tool is that it can be sharpened without removing the blade and the handle affords a convenient hold for the sharpening process. In actual use we rarely remove the blade from the handle unless to substitute another.

The carpenter will find this tool convenient for cleaning plaster from the edges of jambs, for cleaning up quarter rounds and for a variety of uses.

That peculiar characteristic of the scraper "edge" which makes it necessary to frequently change the angle of cut in order to get the best service and avoid frequent sharpening is something which must be reckoned with in determining the good qualities of any tool of the scraper type. Always avoid a tool which demands some other tool to adjust it. As a general proposition the simpler the tool the better suited it will be for the purpose and a greater quantity of work will be the result.



## CHAPTER II.

### Sharpening a Scraper and Laying the Floor.

The frequent inquiry regarding the proper method of sharpening a scraper indicates a dearth of knowledge on this subject. Without any disposition to assume superior knowledge in this connection I am constrained to remember that we cannot clean our floor without sharp tools, and will give our readers the benefit of my experience along this line.

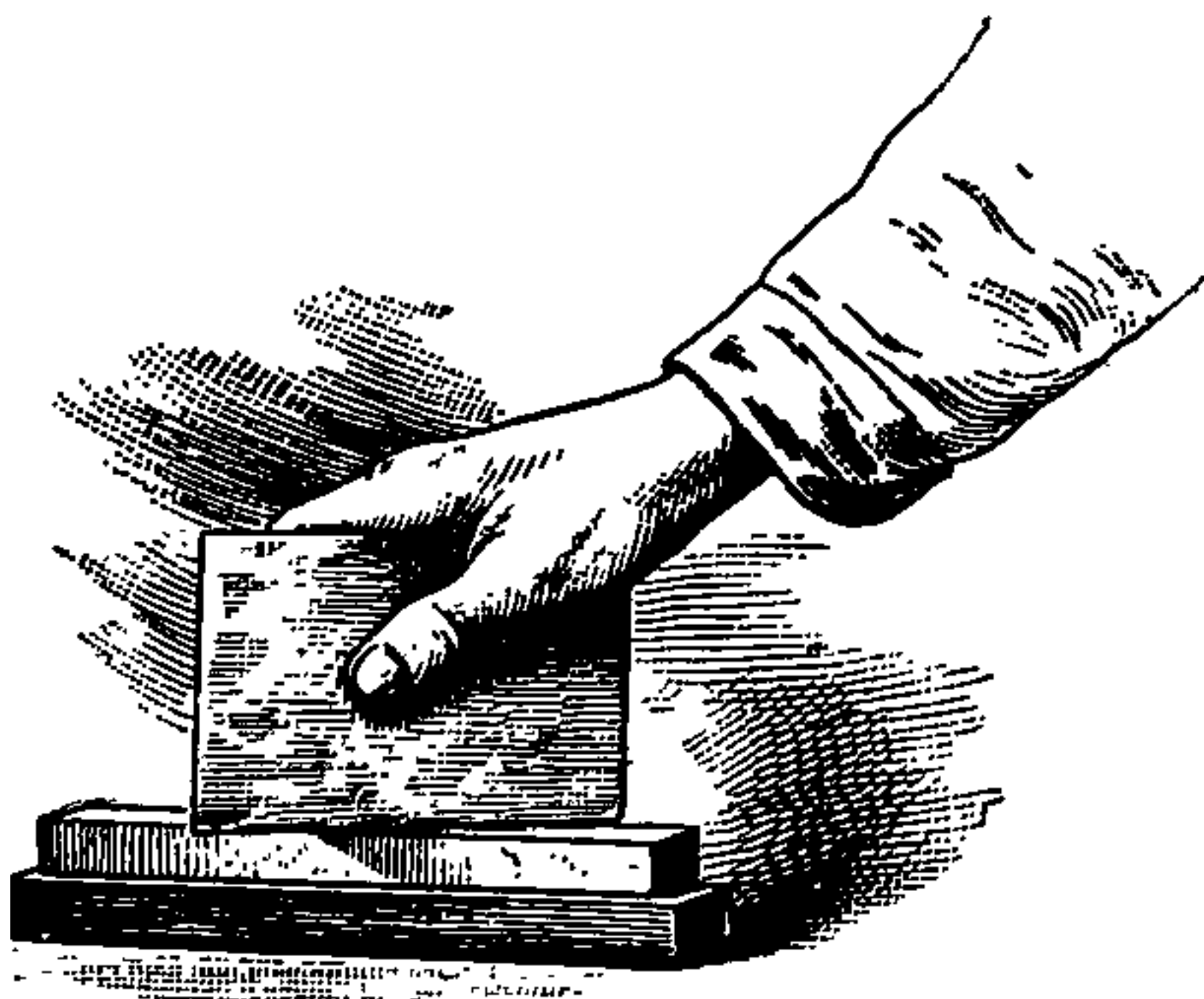


Fig. 7.—Position of Scraper on Oilstone.

I presume that every reader understands that the cutting edge of the scraper is formed by turning over a “burr” or wire edge, which does the cutting when applied to the wood. This burr is made by rubbing against the edge of the scraper with a tool called a burnisher, which may be made of any piece of steel of

convenient form but which must be harder than the scraper. A common method is to grind a file down until a perfectly smooth surface is secured with the corners slightly rounded and the tool set in a convenient handle. A simpler and much better method is to grind a smooth

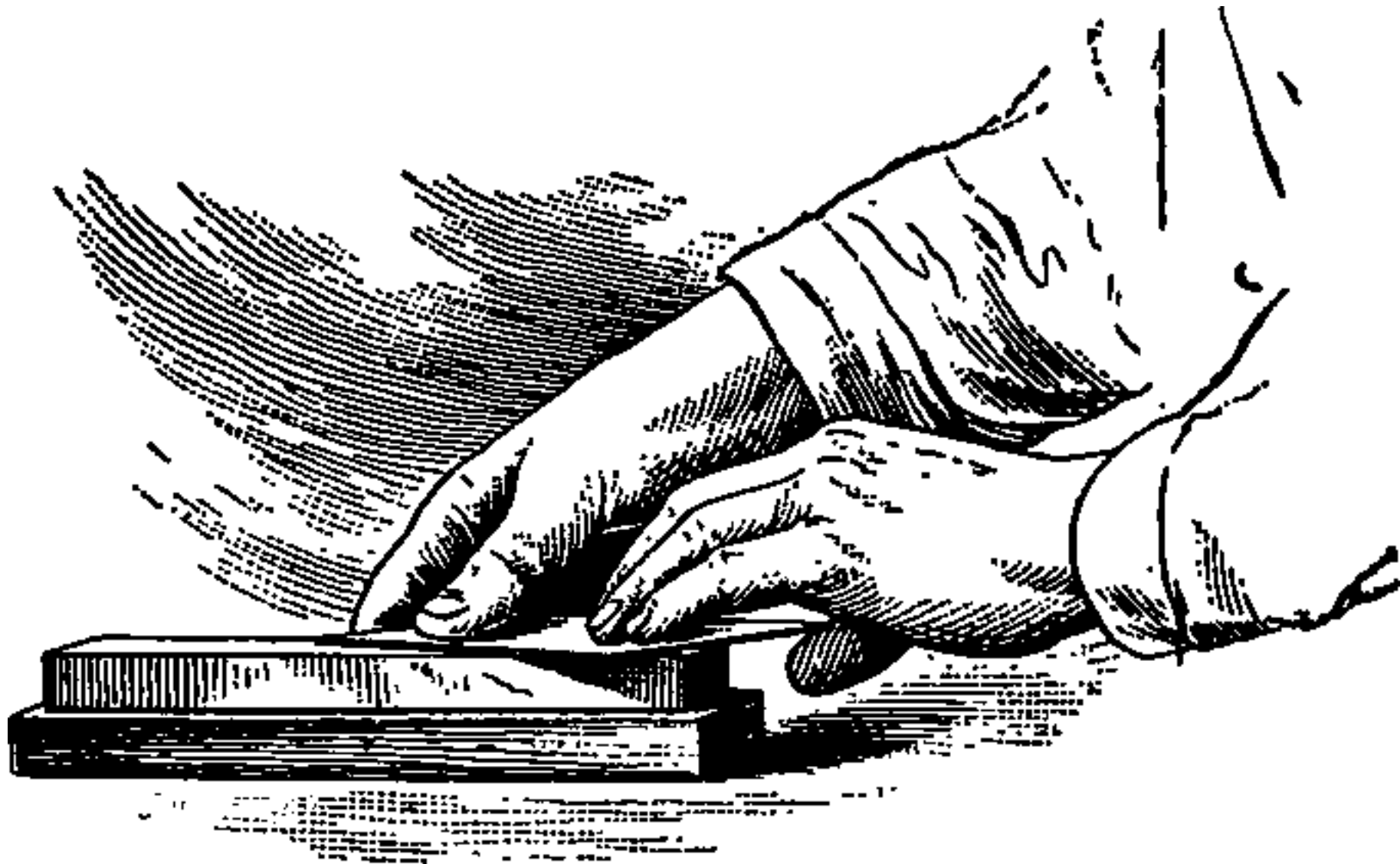


Fig. 8.—The Scraper Laid Flat on Oilstone.

point on a discarded nail, set and mount it in a handle, like the burnisher illustrated. Do not forget to put a point on it and make it sharp.

Whether the edge of your scraper should be square or beveled will depend on the class of work you have to do. If it is fine bench work on very hard wood and you wish the finest possible finish use a square edge and turn the burr on your scraper for a light shaving. If you are on a floor or other work where fast cutting is required and plenty of sandpaper will follow use a beveled edge and have plenty of steel back of the edge to hold it firm.

Whether you file or grind your scraper will depend largely on the temper of your steel and your own disposition. In either case you will have to whet the edge smooth on an oil stone before a satisfactory cutting edge

can be obtained. Now don't forget that to have a scraper cut well it must have an edge as smooth as any other edged tool used for fine work and this edge can only be obtained on the oil stone.

If you are using the common cabinet scraper and the class of work will permit the square edge will be desirable, inasmuch as you can secure eight cutting edges and avoid frequent sharpening.

Let us suppose that we have ground or filed a straight and smooth edge on our scraper, and then put it on the oil stone.

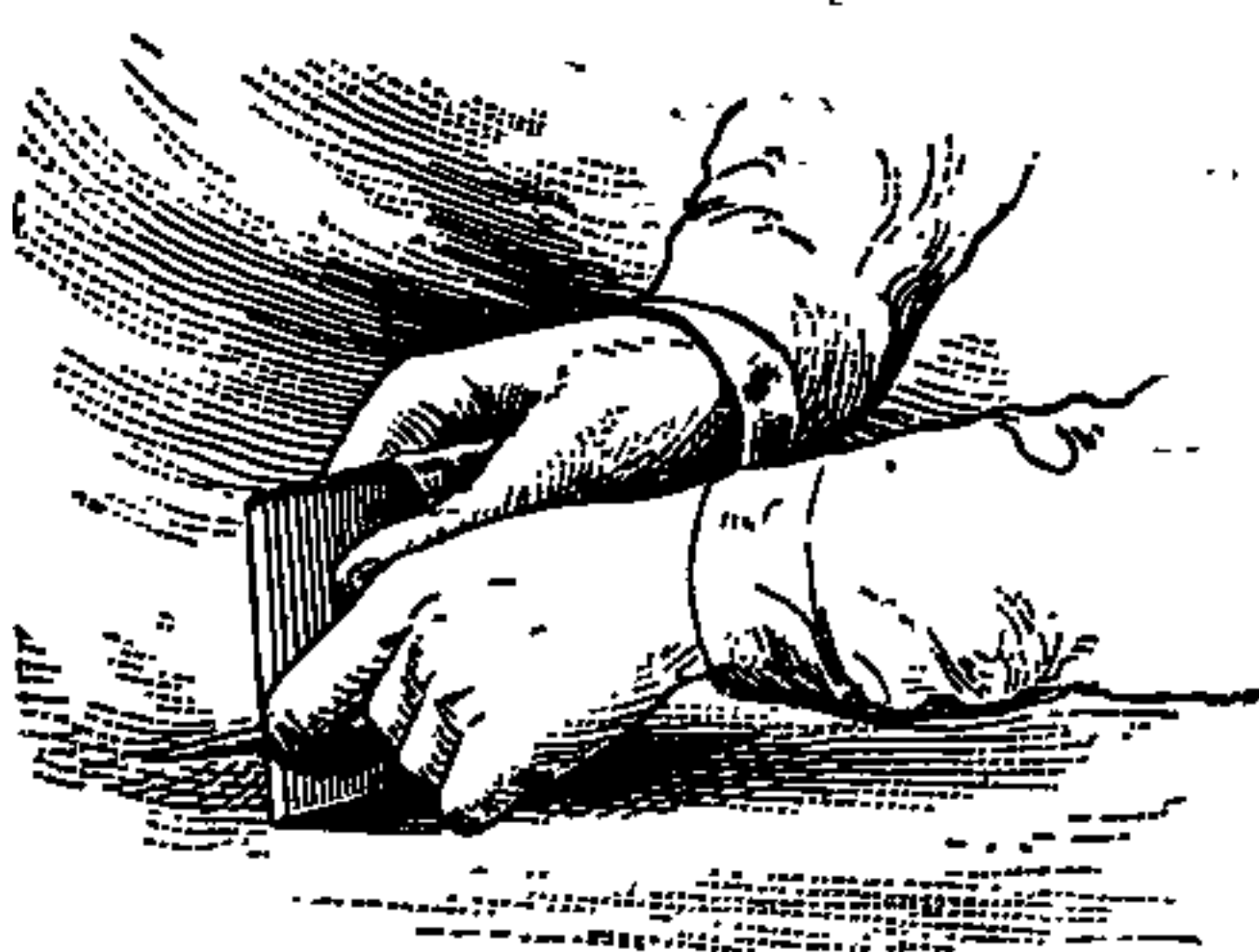


Fig. 9.—Turning the Edge.

After you have rubbed down a pretty smooth edge turn the scraper down flatwise on the stone and take off the wire edge.

Repeat these operations with every cutting face of your scraper until you have a corner as smooth and sharp as you would put on a smooth plane. Having reached this point we are ready for the burnisher.

Now set your scraper firmly on the bench and hold it in position with your sinister hand while the dexter one grips the burnisher and with a stout upward pull against the corner turn the edge.

Better protect that sinister hand with a bunch of shavings or something else, for the edge is likely to cut your hand if the oil stone has done its duty.

You will now find that there is a little hooked edge turned over on your scraper if you have made a hard and steady pull with the burnisher. To make sure that this edge will be perfectly smooth turn the scraper down on the bench at an angle and “point out the edge.”

Here is where that sharp point comes handy on the burnisher. Incidentally, it is useful for starting screws, marking keyholes, in fitting locks, etc., but indispensable

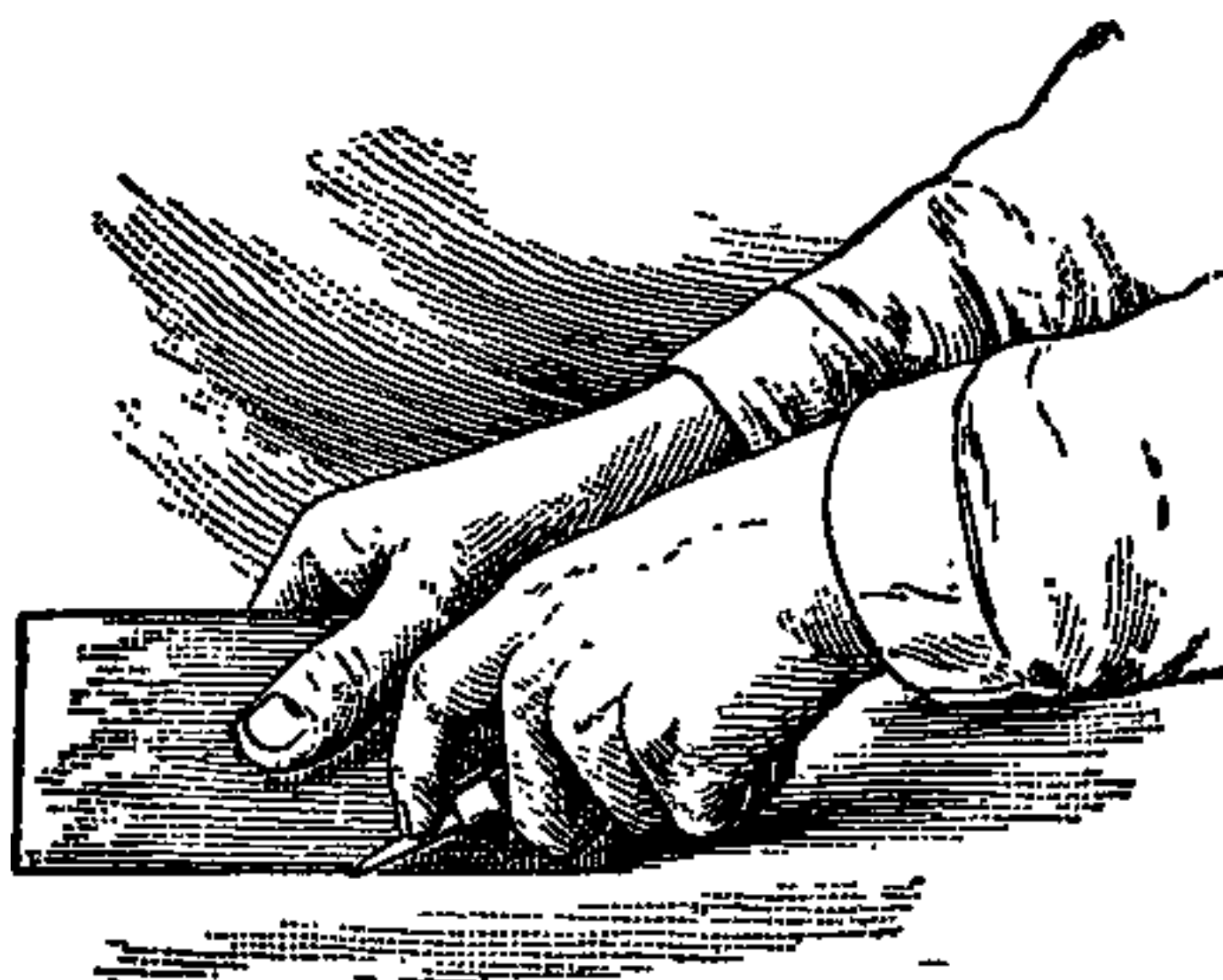


Fig. 10.—Pointing Out the Edge.

as a sharpener for the scraper. Be careful to put the point exactly in the angle where the little burr turns over the edge of the scraper and ever so lightly and carefully draw it along the whole length of the angle to smooth up the cutting edge of the burr, then more lightly than at first turn the edge again with a single stroke of the burnisher.

If you have been happy in following these poor instructions you will now have an edge which will cut a shaving as fine as silk and as fast as you can pull the tool. Presently it will get dull. This will be largely

caused by the gathering of fine particles of dust in the angle of the burr if your wood be free from sand or grit, so take your burnisher and carefully "point out" again and turn the edge lightly afterward. You will be surprised, if not familiar with this method, to see how long the tool holds its edge without sharpening, but don't forget that everything depends on the oil stone to begin with.

After this operation has been repeated two or three times the scraper will really become dull and the pointing out process fail to work. Then turn the tool flat

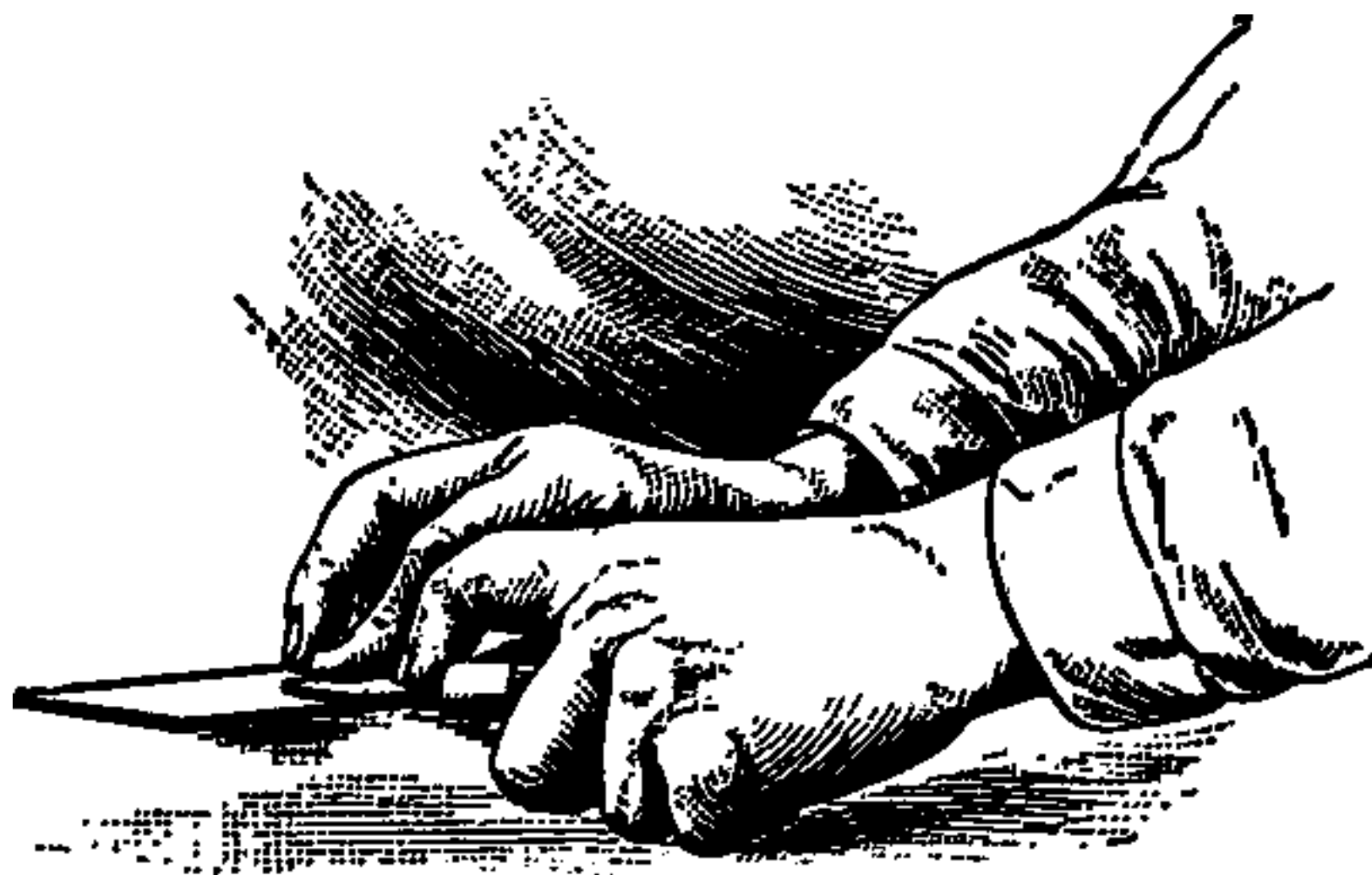


Fig. 11.—Rubbing Out the "Burr."

down on the bench and with the burnisher rub the edge smooth.

A few brisk strokes of the burnisher will turn back the burr and the edge will be observed to be more or less full of imperfections. If not too badly worn and the steel be of good temper you may return to the oil stone and again smooth up the edge and repeat the processes of turning, pointing out and finally turning the cutting edge.

Having our tools all well in order and possibly a trifle in advance of the time of need we will proceed to the preparation and laying of the floor.



### **Laying the Floor.**

In considering this portion of our topic much depends on whether the surface to be covered is in a new or an old building. If in the latter we must prepare the surface of the old floor with considerable care, bearing in mind the thickness of our new floor and the finished results to be attained. Should the new floor be seven-eighths in thickness the treatment will be comparatively simple, as inequalities in the surface of the old floor may be remedied by judicious use of "furring" strips of various thickness placed not more than 16 inches on centers. A large portion of the work which comes to experienced floor finishers is of this character and the old floors are nearly always in a state which requires considerable preliminary work in leveling up before the work of laying the new floor can be begun.

In new buildings the general custom is now to lay a floor lining of common boards when the building is inclosed, and in any case it is well to carefully level up the floor lining and cover with building paper before starting the new floor. Wherever practicable the use of "furring" strips between the floors is recommended. In ordinary cases nothing is better for this purpose than common plastering lath. These can always be used to advantage where the finish floor is seven-eighths thick, as the floor lays easier and an air space is preserved between the floor and lining, adding materially to the warmth of the finished buildings.

In laying floors in an old building we are frequently confronted with a floor which is so badly out of level as to render necessary the taking up of a portion of it and relaying before a surface can be obtained sufficiently level to receive the new floor. This is particularly true in



laying the thin sort of hardwood flooring now so popular. This material is milled for three-eighths thick and usually runs about five-sixteenths in thickness, rendering it absolutely necessary to have a solid underlining for the entire new floor to rest upon. It is highly important that the under surface be sufficiently level and smooth to prevent creaking of the finished floor. The apparent necessities of the case commend the free use of building paper, which is inexpensive and serves to cushion over many little inequalities and render the finishing much easier of accomplishment.

All these little necessities should be carefully considered in estimating the job and the owner be given to understand that the cost of laying a new floor is not always minimized by the presence of a comparatively good old floor over which to lay the new one.

#### **Floors in New Buildings.**

If the building be new and the rough floor be warped by the dampness incident to plastering be sure to level off all uneven joints before starting the new floor. Much of this trouble may be avoided by using a good quality of shiplap boards for the rough floor and using cement coated or "box" nails for the nailing. Drive the nails not more than  $\frac{1}{2}$  inch from the edge, drawing up the heads well, and warping will cause little trouble.

Should the necessities of the case require the laying of the floor before plastering be sure and cover it with a double thickness of building paper before the plasterers arrive, and charge up in your estimate an additional 50 per cent. for the extra cost of finishing the floor because of the sand which will get into the surface.

If there is a large quantity of floor to be finished it

will always pay to lay a rough floor for purposes of construction and not bring the finish floor into the building until all other craftsmen have departed.

The finish floor, whether of pine or hard wood, should be kiln dried for at least ten days before laying, if a dry kiln be accessible and not brought into the building until all plaster is perfectly dry. Nothing is so trying to a floor as the superheated atmosphere of the modern residence. Do not allow your lumber dealer to persuade you that the floor is "dry enough" or that it "was kiln dried when he bought it." Ordinary shed storage in a lumber yard for two weeks will put sufficient moisture in the material to render the results quite unsatisfactory after the heat has been turned on for a while.

Five or ten dollars will cover all additional expense for drying and hauling for the floors for the average residence, and any sensible property owner will cheerfully pay this small additional cost if he understands the benefits to be derived in superior wearing qualities and finish. It sometimes happens that a customer wants a new floor in a hurry, but insist on two weeks' time to dry your material, for it will pay you and your client.

Experience demonstrates that a newly scraped floor is liable to damage from careless feet; that it is advisable to defer laying the finish floor until all other work is done so far as possible, finishing a room at a time and barring all entrance thereto until the painter has completed his work. If this rule can be adhered to it will save much grief and expense to the contractor.

It is our custom in finishing floors to put all trim in place and let the painter finish his work up to the last coat before laying the floor, leaving the painter in sole possession and responsible for the care of the floor after

the carpenters leave. If this is not done the owner or some chance visitor may track up your floor and cause untold trouble and expense. Lock all doors and admit no visitors if you would save your floors from damage.

### **Selecting the Flooring.**

In selecting flooring do not forget that every peculiarity of the surface will be accentuated by the finish. What may appear to be comparatively small defects in the board will be glaring blemishes in the finished floor. Look out for sap streaks, pitch pockets, knots and defective milling. It frequently happens that careless machine work will leave the end of the board a little narrow. This is particularly common in yellow pine flooring coming from Southern mills. Constant scrutiny is necessary to prevent the creeping in of such defects.

It should be the business of one man to select and match up the floor as to grain and color, and this man should thoroughly understand his business. If there be nine rooms with a perfect surface and one with a blemish as big as a dime the owner will find that blemish and put his finger on it to your discomfort before he sees any of the nine perfect rooms. The moral of this is that the way to avoid criticism is to make criticism impossible from any reasonable point of view.

In selecting Southern pine flooring (and nothing is more beautiful and durable if properly handled) choose the quarter sawed stock, giving preference to the harder boards with narrow and even grain. Soft boards or flat grain do not finish as smoothly or wear as well. A most beautiful variety of color and grain can be secured in the Southern pines and a pleasing contrast is secured by using this floor in rooms finished in darker woods.

It should not be necessary to caution the carpenter about two elementary things, viz., avoid hammer marks on the edge of the floor and use up your pieces as you go along. Yet these two points require constant watchfulness. Pieces may be easily used up as they are made and prevent wasteful accumulation without detriment to the finished results. If the rough floor be stripped with lath the board may be cut full length regardless of the location of the joist and a bit of lath slipped under the joint, the piece left at the end being carried back to start the next run of boards. By pursuing this plan all joints except the final one may be cut as the boards lie on saw horses, greatly expediting the work, and there will be no pieces left to go into the scrap pile when the floor is laid.

These suggestions may appear unimportant or superfluous, but it will be found that due heed to "short cuts" of this sort makes a material difference in the percentage of profit.

Nearly all hardwood flooring is now end matched, making it possible to use up short lengths with great economy of labor, and it is also bored for nailing. The boring, which goes about a fourth of the way through the board on the tongue edge, greatly expedites the nailing, and in the harder woods avoids the damage caused by bending nails or splitting of the board.

A special flooring nail is now made in gauge of wire about the weight of an 8d. common and in length and style of head like a 10d. casing, and with numerous small transverse corrugations, or crimps, which serve to give it a firm grip and considerable drawing tension when driven up. In appearance it is about like the 10d. casing but of a heavier gauge of wire. This nail can be pur-

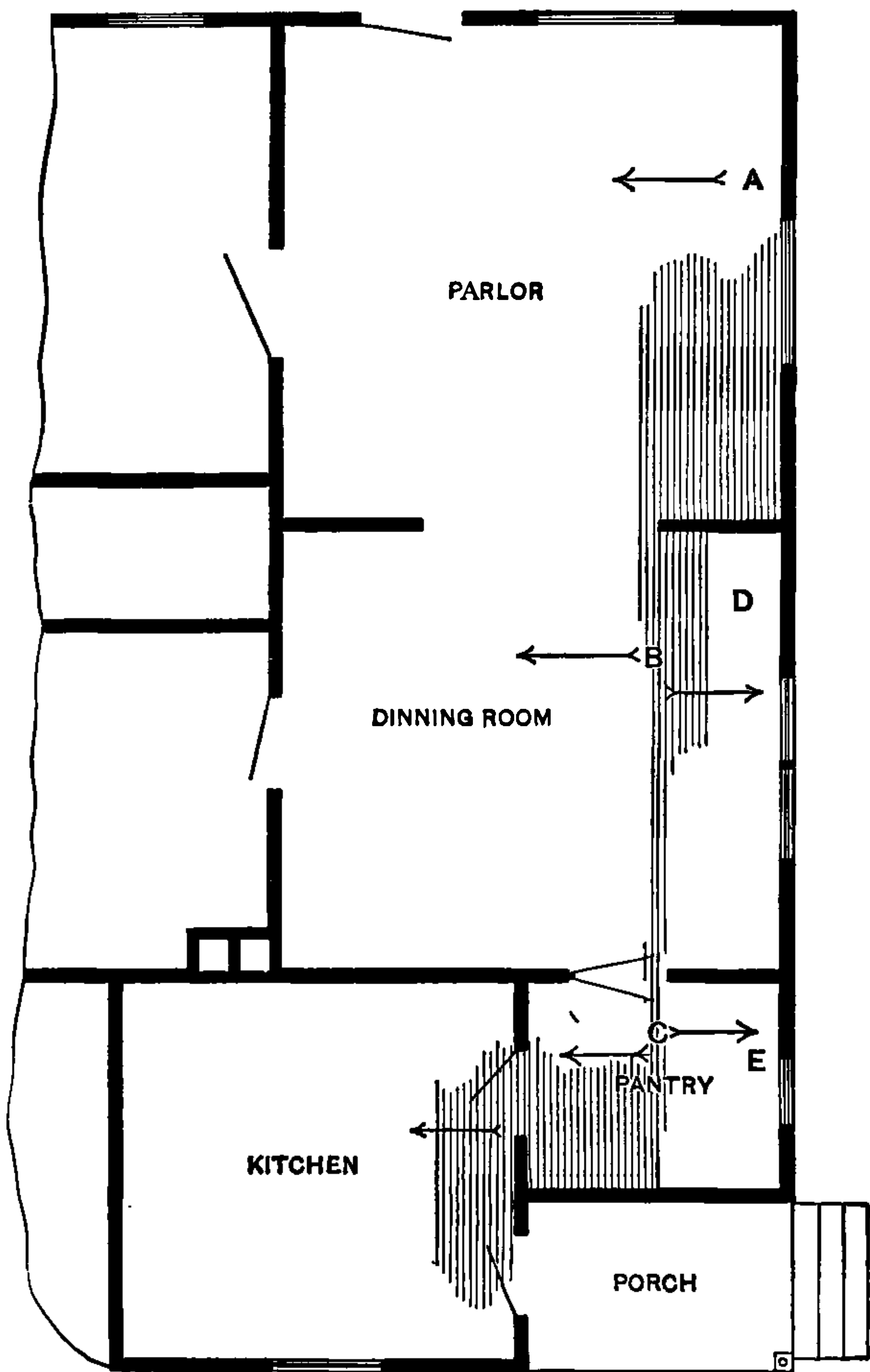


Fig. 12.—Partial Plan: Showing Method of Joining Floors in Adjacent Rooms.



chased in quantity at about the same price as the ordinary nail, and will be found very serviceable for its special use.

In laying thin floor use 1½-inch No. 16 wire brads, face nailing both edges every 12 inches and sinking the nail heads with a fine nail set. Ordinary blind nailing will not keep thin floor from warping or creaking. If the filler is properly applied the small holes made by the nail heads will be filled up.

Difficulty is often experienced in making the floor in two or more adjacent rooms line up properly through connecting doorways, but this difficulty may be avoided by pursuing the following simple plan. Referring to Fig. 12, which represents a partial plan of the main floor of a dwelling, the floor may be started at any convenient point, as A, where the largest possible surface can be laid in a given direction. Continue in regular manner through the connecting openings into the adjacent rooms, being careful to keep the boards lined straight. The unfilled back portion may then be laid by inserting a loose tongue made of a thin strip as at B and C and laying the remainder of the floor in the opposite direction. The joining should be well face nailed and if the floor be laid on strips the joining should be underlaid with a strip placed lengthwise to reinforce the loose tongue.

It will be observed that in the plan, Fig. 12, the larger portion of the floor in the entire house can be laid in the same direction. A little careful planning will enable one to get out of troubles of this kind easily. I have occasionally seen attempts to start at relative points in the adjacent rooms, as at A. D. and E, laying the floor in the same direction and trusting to good measurement and good luck to line up properly at B and C. The nat-



ural variation in driving up the boards and difference in width will generally give quite unsatisfactory results when this plan is followed, to say nothing of the additional time consumed, all of which may be obviated by the use of the method indicated.

The only apology for the suggestion of these very simple and elementary methods is that they tend to increase the element of profit and to counteract in some degree the apparently natural tendency on the part of many good mechanics to take the longest and most difficult way to accomplish a given end.

## CHAPTER III.

### Finishing the Floor.

The floor being laid and due care exercised to protect it from injury, we are now ready for the final work of the carpenter. This is where we lock the doors, deny ourselves the privilege of visitors and settle down to the real business which has involved so many painstaking preliminaries. Just a friendly caution here; you are not ready to finish the floor until everything else is done which is possible. See that all mantels are set and tile hearths laid; all plumbers and furnace men out of the way; all doors and windows hung and hardware screwed in place; shelves, closet hooks, cupboard fittings and all the numerous odds and ends which consume time and cause running about the house safely out of the way; all inside work on and finished, up to the last coat of varnish, the shoe for baseboards fitted and ready to nail in place; all holes for hot and cold air registers cut to exact size; all picture moldings up; in fine, everything done so completely that you can turn the keys over to the painter with the certainty that the carpenter will not have to return. In such a case you are ready to finish floors, and in most cases the painter will have sufficient pride in his work to properly care for the good job you have left for him.

#### **Preliminary to Finishing.**

It is immaterial where you begin if a good exit is assured. There will be a work bench, tool chests and a few hundred scraps to move as you reach the last room; be sure that you can get them out of the house to stay, without tracking over the floor already finished. Sweep

everything clean and provide plenty of sharp tools. If the floors have been traveled over to any extent there will be particles of sand and other rubbish ground into the surface which do not tend to sharpen tools. Go after them with a common cabinet scraper drawn quartering across the boards. When you hear something say "click," stop and get it out of the way. If you don't get them this way you are certain to get them with a sharp plane or scraper, to your discomfort. The sand being removed, and carefully swept out of the room (use a 10-cent whisk broom and a sheet of sandpaper for a dust pan), we are ready for the plane and scraper.

Don't forget at this precise juncture to round up the "gang" again and get all shoes cleaned up both as to nails and dirt. Gymnasium slippers or soft shoes of some sort are very desirable, as ordinary leather is very likely to leave dirty streaks after the wearer.

Of course, it costs money to buy shoes, but it will pay the "boss" to give the boys a little bonus in the way of extra pay if they will provide clean soft shoes when they work on the floor. When the comfort of wearing something of this sort is experienced it will not be necessary to suggest it on future jobs. Most of our workmen have gymnasium shoes in their chests ready for any special job requiring clean feet, and consider the dollar as well spent as if used for any other necessary tool.

If the job is properly specified it will be necessary to put a cabinet finish on the floor. This means that every evidence of machine work must be removed and an entire new surface left for the painter. No machine has yet come under our observation which will do work equal to hand finish. If the floor be well milled and evenly

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laid the scraper will do most of the work. Use a scraper with a handle and get one that "pulls" rather than one that "pushes." Ordinary cabinet scrapers heat quickly and blister the hands, besides being of too light steel to be serviceable on the floor and exceedingly difficult to which to fit a handle.

It is about at this stage of the proceedings that the "boss" begins to lose money. The average workman has not had sufficient practice in what the Salvation Army terms "knee drill" to take kindly to exercise of this sort and gets tired early in the game. Herein lies the value of having about two men to the room, as there is a smaller number to visit when resting time comes and it comes frequently in this kind of work. It is possible, however, to mitigate the hardships of toil by frequent changes of position which rest the knees and back. We are not partial to knee pads, cushions, etc., calculated to soften the floor for the toiler. The writer is not too old or too prosperous to get on the floor with "the boys," and it is the result of our observation that the man who is filled with the proper spirit of hustle is too busy to be dragging around a sack of shavings as a cushion for the southern end of his anatomy.

Should the floor be very rough, as often happens with Southern pine, it may be necessary to traverse it with the jack plane to level the surface, using a quartering stroke to avoid tearing the grain. A trip once over it with the smooth plane will then put things in good shape for the scraper. Traversing is often a time saver and always results in a much more level surface if it be carefully done.

The final finish and the amount of labor to be put on is determined entirely by the character of the job.

Should the room be one to be covered with rugs, leaving only an exposed border, the task will be an easy one, as the center can be cleaned quickly with the plane to leave an even color. Rooms requiring the entire surface exposed should be finished to the smoothness of fine furniture, carefully scraping out all rough places and bearing in mind always that every defect will show up through the polish. Be especially careful to avoid a wavy or ridged surface caused by uneven scraping or "chattering" of the tool, and clean out all plane marks carefully. I have never yet met the man who could plane a board as smoothly as the scraper will finish. Much trouble with the plane may be avoided by slightly rounding the corners of the bit when sharpening. The same holds true of the scraper, but on the latter tool the round should be barely perceptible—just sufficient to keep the corners from scratching.

The reader will pardon me for talking as if to amateurs or a class of students in a manual training school. The fact is that some few hundred fairly good mechanics who have come under my personal observation have yet to learn some of the fundamentals in tool sharpening, and this may meet the eye of some such, who will take these elementary suggestions as kindly meant.

The scraper should be invariably worked lengthwise of the board (except in case of badly cross grained stuff) and more rapid and satisfactory results will be secured by pulling the tool slightly quartering. The Starrett "Universal" is particularly neat of adjustment in this particular, owing to its ball and socket joint.

### **The Final Smoothing.**

For the final smoothing nothing is more rapid and effectual than steel wool, followed by No. 1½ sandpaper



for pine, and No. 1 for the hard woods. Use No. 3 steel wool and be sure and get the home product, which bears on the label, "Steel wool No. 3. Made in the United States."

This particular brand is emphasized because there is a similar article "made in Germany," which is far inferior and sold at the same price. The American wool has no equal for smoothing quality. Fifty cents' worth will smooth 1000 square feet of floor. Take what may be comfortably held in the hand and rub it with a turning motion, quartering across the board, finishing with a lengthwise motion, and look out for splinters, for it is rare stuff to get into the fingers and hard to get out. This may be profitably followed with sandpaper if a specially smooth job is desired, though a good job, quite up to the average, may be secured with the steel wool alone. For cleaning up dirty floors which have been soiled before the painter reaches them it has no equal, and it is equally good in cleaning plaster stains and other dirt off wood work.

Steel wool should be frequently turned over when using, in order to present a new cutting surface to the board. It cuts on the same principle as a package of miniature knives, and when used with discretion will do its work with wonderful rapidity and leave a fine gloss on the surface, owing to the smoothness with which it cuts.

Because of the fact that steel wool cuts more like a plane than sandpaper, it is important that it be followed with a finer grade of sandpaper than would be used were the finishing to be done with sandpaper alone.

### **The Painter's Work.**

Everything in the way of finishing results depends



on this craftsman. While he cannot produce a satisfactory job without good carpenter work, he has it in his power to ruin the entire job by using unsuitable materials or by careless use of good ones. There are some few fundamentals in the matter of materials which it is well to emphasize:

1. Never use a liquid filler on a floor.
2. If a filler be required, always use a paste filler and give preference to that made by some manufacturer making a specialty of floor finishes.
3. Always use the filler in the manner specified on the original package without change or adulteration; it is only fair to the manufacturer to assume that he knows his material better than you, and it should be used according to his directions.
4. If a varnish finish is specified never use an inferior varnish for a first coater, expecting to get satisfactory results.
5. If stains are used stick to alcohol stains or "wood dyes" so called. They are more quickly and smoothly applied than either oil or water stains and cost little, if any, more, while the results are more permanent and the imitation of the desired wood is usually better.
6. Never under any circumstances use shellac on a floor. (Here's where we get into a row with about 90 per cent. of the painting fraternity, but the reasons will be given in due time.)
7. Do not use varnish on kitchen, bathroom and other floors requiring frequent scrubbing; it will not stand the racket. No exceptions in favor of anybody's floor varnish, manufacturers' claims to the contrary, notwithstanding. Avoid wax on such floors for the same reason. If recourse is had to hot linseed oil preparations give

ample time to dry hard, for they are the greatest dust and dirt traps in the world when not thoroughly dry. Look out for fluid waxes, etc.; they may be good stuff in the can, but are risky material for floors.

After this wholesale warning it will be necessary to specify some finishes which may be used on floors with safety. We will first take floors requiring only a brush finish. For floors requiring scrubbing boiled linseed oil put on hot is an excellent finish, but must be given ample time to dry hard between coats and must not be exposed to wear until absolutely dry and hard, for reasons given above. A better finish for these floors is Johnson's No. 1 Floor Finish. This is made especially for floors requiring scrubbing and is the best preparation we have ever used. It dries quickly with an orange color, and a second coat can be applied the same day. When dry it is very hard and its wearing qualities are unsurpassed. It has the additional advantage of being very fluid and does not show brush marks readily. I think that a fairly good job could be made by spreading it with a broom in the absence of a brush, though I do not recommend a broom for this particular purpose.

These have their desirable points, chief among which are the ease of their application and the possibility of a quick finish when left in the gloss. The preparation of these finishes has now reached a degree of perfection so that cracking and showing of heel marks has been largely obviated. For floors subjected to the minimum of wear, as bedrooms, etc., they are among the most desirable finishes. They are also specially suitable for tenant houses, owing to the fact that a yearly renewal of the surface is usually sufficient to keep a fairly presentable appearance, while wax requires a more frequent attention.

The surface being filled with a paste filler, if of a wood requiring a filler, and all cracks, nail holes, etc., carefully puttied, apply the varnish according to manufacturer's directions, giving ample time to dry. Two coats over filler or stain will give a very satisfactory job, though three coat work is recommended.

The writer gives preference to Pratt & Lambert's No. 61 Floor Finish, or Berry Bros.' Liquid Granite; as the



Fig. 13.—The Weighted Brush.

most satisfactory varnishes within his knowledge.

It should be said with reference to varnish finishes that no varnish should ever be put on a floor unless specially made for that purpose, and that liquid fillers should not be used, for they are not made of the elastic materials required for the hard wear to which the floor is subjected. Most makers of floor varnishers explicitly specify that liquid fillers are not to be used on floors.

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A very cogent objection to varnished floors is that the unusual wear to which they are subjected causes the finish to wear off in spots indicated by the line of general travel across the room and that when once worn thus unevenly no amount of labor can restore the surface to its original state of finish.

While it is true that a fairly good general appearance may be given to the floor by a coat over the entire surface, it is equally true that it is impossible to patch the worn places, and nothing short of going over the entire room will repair the damage done by passing feet.

No technical directions as to rubbing and general precautions are deemed necessary in the limits of this paper, for it must be said in justice to the craft that the majority of painters who have arrived at the dignity of finishing work are competent and careful workmen.

## CHAPTER IV.

### Various Finishes.

#### **Wax Finishes.**

These possess all the desirable requirements for a satisfactory floor finish when properly applied. Use the same ground as for varnish. If a high gloss finish is desired use a first-class floor varnish for second coater, leaving ample time for drying and rubbing lightly before applying the wax. Preference is given to this rather than to shellac, which is so commonly used and specified by so many manufacturers and architects, because of the extreme slipperiness of shellac and the added fact that it cracks easily. The latter fault alone should be sufficient to condemn it for floors. When one considers that much of the commercial shellac is liberally adulterated with glue, and other substances not so durable, sufficient argument will be apparent against its use as a floor coating.

Some manufacturers now put out a "Floor-Lac," or substitute for shellac or varnish, as a second coater which may be used with entire satisfaction where the high gloss effect is desired.

When it is considered, however, that the gloss of a wax finish deepens with age and constant polishing, it will be found quite satisfactory to wax directly over the filler, and many of our finest jobs are now finished in this manner. The writer recalls a very fine oak floor which was finished in this manner for one of his most exacting clients, purely as an experiment, and which has proven an entirely satisfactory job and is constantly im-



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proving with the occasional renewals of surface which it receives.

There is a peculiar degree of cohesion attainable by the union of wax and paste filler which is not attainable with any of the highly elastic and glossy second coaters, adding greatly to the wearing quality and affording a depth of gloss and mellow reflection which cannot be afforded by the superficial gloss of the hard undercoating so often resorted to. This style of finish is unqualifiedly recommended with the knowledge that it will prove entirely satisfactory to the most exacting.

Considerable natural prejudice exists against waxed floors in the belief that the finish is one requiring an unusually high order of skill to prepare and keep in condition. Nothing could be further from the truth. Any good painter can wax a floor satisfactorily and any house wife can keep it in condition if possessed of sufficient bodily strength to manage a weighted brush.

In selecting a wax finish give preference to the paste preparations, which are rubbed on with a woolen cloth. The surface should be properly prepared with filler, etc., and thoroughly dry, the room warmed to a comfortable temperature if possible. The surface is lightly rubbed with the wax cloth, being careful to spread the wax evenly and not too thickly. About 30 minutes should be allowed for the wax to partially dry and then the surface should be gone over with a weighted brush, such, for example, as that shown in Fig. 13.

Brush crosswise of the boards first, covering the surface three or four times, and finish lengthwise. This distributes the wax evenly and lays the foundation for a fine polish. If the room is to be occupied immediately a second coat may at once be applied and brushed in the

same manner, using a piece of Brussels carpet under the brush for the final polishing. The use of the carpet will give a beautiful gloss, which may be increased by its frequent use as often as may be desired.

Waxed floors should have a coat of wax at least once in three months, being careful to remove all dirt and dust from the floor before the waxing. In the absence of any specially prepared cleaner a soft cloth slightly dampened with kerosene will take off soiled spots very quickly, being careful not to use too much of the oil, as it will soften the wax. Avoid soap and water, especially hot water, on waxed floors, although a slightly dampened cloth may be used without detriment. The general caution to never wax over oil or to use turpentine as a cleaner should be observed, but the slight quantity of kerosene adhering to the surface in cleaning in the manner recommended will speedily evaporate. After cleaning a floor should never be waxed until entirely dry.

This additional advantage pertains to wax, that worn spots may be waxed without going over the entire surface and the job will look as good as new. The extreme slipperiness of wax will be found to be materially reduced if it is done directly over the filler. I am aware that this method is not generally recommended, but in the cases in which it has been followed in my experience it has proven entirely satisfactory.

The chief and final advantage of wax to which I shall refer is that it brings out and enhances the natural beauty of the wood with a soft and mellow depth of lustre which cannot be attained by any other preparation with which I am familiar. The beauty of finish, instead of deteriorating, increases with age and subsequent applications. It is practically proof against heel marks

or scratches and is easily kept in repair without calling in the aid of an expert craftsman.

A word of caution should be given here which may be well passed on to the family who are to live over the floor you have finished. No floor which is properly finished will remain in a satisfactory state long unless care is taken to prevent excessive wear. Shoes with nails projecting or covered with dirt are as much out of place on a polished floor as they would be on the top of the piano or parlor table. Care should be taken to avoid dragging or rolling heavy furniture over the floor and a good cleaner should be placed at the outer door for the shoes of visitors. A floor once mutilated can never be restored to its first estate, and the one who finishes the floor owes it to himself and his client to fix these precautions firmly in their minds.

One of the most unsatisfactory tasks which comes to the mechanic is to be called on to refinish an old floor which has been spoiled in the beginning. In such cases one must be governed entirely by the conditions and the desires of his client. If they are willing to pay for a good job the best thing is to take off all the old finish with varnish remover and steel wool and have the carpenter scrape an entirely new surface on the floor. In this manner a job may be made as good as new, although it generally entails more labor and expense than to have done a good job in the beginning. Such undesirable tasks are usually due to poor carpenter work or poor painter's work, or a combination of both, and should serve as a warning to have nothing but the best in both labor and materials.

## CHAPTER V.

### Estimating the Work.

The portion of our topic relating to estimating is approached with some degree of timidity. There is probably no business in existence of equal magnitude in which there is so manifest lack of system in estimating as that of the building contractor. Lack of close association between builders, coupled with the natural distrust incident to a business handled in comparatively small individual contracts, under active competition among a class of men (pardon me for speaking plainly, the truth demands it) whose limited opportunities for general business training naturally unfit them for close specialization even along the lines of their own particular industry, has left this whole problem in a chaotic state, except for such chance ray<sup>"</sup> of light as is occasionally afforded by some member of the architectural profession, who gives us an article or a treatise upon this subject.

These chance contributions from our friends of the learned profession referred to, while excellent in their way, usually lack the very essential element of intimate personal observation and experience on the part of the man who really conducts the business—*i. e.*, the builder himself. It is entirely possible for a group of public spirited builders in any given community to tabulate the results of their every day business for a period of, say, one year, and after a little careful comparison of notes to establish a fairly accurate basis of estimating for that given locality. To be sure, if such a reprehensible prac-

tice were indulged in and the aforesaid builders were to thereby establish their business upon a paying basis, it would to a certain extent eliminate competition, and possibly result in some of the building craft making an honest dollar occasionally.

### **Elevating the Trade.**

Certainly it would result in a gradual raising of a trade to the dignity of a business enterprise, and the saving to the community in absence of liens, law suits and inferior building, now resulting from the present haphazard methods would be beyond computation.

But, so far as the writer's knowledge extends, that locality is yet to be found where the building fraternity in a spirit of mutual helpfulness and a desire to benefit their individual condition have undertaken any such systematic investigation as is here suggested.

It was definitely tried once in an association of builders by a committee of which the writer was a member, but we soon ascertained that there was a general fear among our brethren that in our individual wisdom some of us might impart some knowledge peculiar to himself, which would place an added advantage in the hands of his competitors, and so the project fell through; not without some beneficial results, however, for the investigation of the committee and the general expression of the contractors in discussing the subject developed the existence of a state of facts probably not peculiar to the locality in question—viz., that among our particular group of builders, to whom fell the majority of the business in a city of 50,000 people, there was not one who had any system of estimating on which he felt that he could rely with reasonable confidence.



I have wondered often since if this condition prevails in the country at large; if one may judge by the differences of opinion expressed in your correspondence columns the condition exists in epidemic proportions and heroic treatment is necessary.

The chief problem in the organization of any business enterprise is the determination of the ratio of expense to quantity of product. No system of estimating for any business can be fixed with any certainty until this ratio is ascertained with approximate correctness. The more nearly this approximation approaches to a definite and fixed ratio, strictly dependable, the more certain will be the element of profit, which will in such a case become a mere question of percentage in the successful operation of the business.

The successful contractor of to-day and of the future must specialize his business to that point where it can be operated along similar lines. A definite percentage of profit, though small, if regularly adhered to, affords a more certain income than the hit and miss sort of calculation, so common among the building fraternity. Rigid adherence to system in the organization of a business has the inevitable tendency to eliminate waste, and profit is the natural result.

The writer recalls a form of estimating in vogue during his "prentice" days; the "boss" would look over the plans or survey the proposed job and after ruminating a while "reckon that we can do that 'ere job in so many day's work." That fixed the labor cost unless Smith and Brown were figuring. Smith and Brown were proverbially low, and in case they were competitors it was always necessary to knock off a few dollars to ensure the job. These preliminaries accomplished, the "boss" would

make up the material bills and reckon up the general contract. Such a thing as a definite relation between the labor cost and the quantity of material to be handled did not usually enter into the calculation, unless it might intuitively creep in during the ruminating over the number of days' work.

To be perfectly honest, have we not all done similar estimating in our callow days, when the responsibilities of having a job of our own loomed large on our horizon?

We are learning better now, but there is still great lack of definite system in estimating labor cost. The vast variety of work in these days is further complicated by the lack of thorough training in the crafts, and the labor item is the one uncertain factor in the building problem. The system of estimating used by the individual contractor must be largely peculiar to himself and based on his personal experience; like all experience, it is likely to be expensive in the acquirement, and he will the more profit by carefully heeding it. The more accurately it is checked up with his daily business the more certain will be his profit on that job, or some future one.

How many contractors are there who can turn to the record of a given job and tell how much it cost to place the dimension lumber in the building, put on the sheathing, lay the floor, siding and shingles and put on the trim? If he had a record of this sort for a dozen jobs how simple it would be to figure a similar job with some certainty. Again, how many builders are there who can tell with any certainty what particular portion of a given job they made of lost money? A grocer who bought eggs for 20 cents a dozen and sold them for 15 cents, expecting to make back the loss by the sale of sugar or coffee, would speedily "go broke" if he managed his entire business on

such lines. The building trade is no exception to the general law of business success.

**System an Important Factor.**

We feel impelled to make these general observations in taking up the subject of estimating the cost of floors, believing that system is the one essential for the contractor. The journeyman has his union and his wage scale; he knows how many dollars will come to him for a given number of hours' work; but his employer does not know with any certainty what quantity of labor he will get for his money or what will be his percentage of profit. There is a screw loose here that needs adjusting badly, and until the intelligent and fairly successful contractor lends his energy to the solving of this problem he will waste his time complaining about irresponsible competition from embryo contractors.

It is entirely possible to fix a rule for estimating "straight work" *i. e.*, work of a given class done under normal conditions. The factors entering into the primary calculation will be:

- a.* The quantity of materials.
- b.* Wage scale and number of hours per day.
- c.* Relative cost of similar work on preceding jobs under parallel conditions.

Should factor "c" not be available the best possible estimate must be made and record kept until this factor can be determined with some certainty.

The foregoing factors being available, it should be comparatively easy to tabulate a fairly accurate basis of estimating for work of any given class, composed again of three factors—viz.:

- a.* Quantity of materials.
- b.* Labor cost per unit of quality.

*c.* Percentage of profit.

The unit of quantity may be variable in the case of different varieties of work, as :

*a.* The square of 100 square feet for sheathing, rough floors, siding, etc.

*b.* The price per 1000 feet board measure, as handling common or heavy dimension for any certain type of building.

*c.* The price per piece or per opening, as doors and windows, or casing.

*d.* The price per 1000 for shingling under specified conditions (all fast men barred).

*e.* The price per lineal foot, as for cornice work of given type, baseboards, chair rail and general work of any character which cannot be otherwise estimated.

The particular form of calculation is nonessential so long as the definite relation is sustained between the quantity of work to be performed and the cost per unit of quantity, this relation always being based on actual experience of work performed under normal conditions.

It should be said also that no system of estimating is worthy of consideration which does not comprehend a definite percentage of profit, which should be invariably figured and rigidly adhered to. If some other fellow is content to work for nothing and board himself, do not voluntarily place yourself in his class for the sake of beating him at his own game.

### **Forms for Estimates.**

This matter of estimating involves another important matter, that of systematically arranged forms for making out estimates. A regular form of printed blank which takes up in detail the various items entering into the construction of a modern building is indispensable.

The writer has used such a form in his business for years and it affords a record of past transactions which is invaluable for reference. This form subsequently came into general use in a limited area, and fellow contractors pronounce it a valuable aid in systematizing their business.

In estimating the cost of finished hard wood floors the initial item of expense is the labor cost. Our experience has determined a fair price for the labor item to be 7 cents per square foot for laying and smoothing, based on 2-inch face floor of good quality in rooms of average size, with a wage scale of 35 cents per hour and an eight-hour day. This price will include cutting off doors for adjacent openings and nailing down the quarter round, but will not justify an unusual amount of leveling up of old under floor; this should invariably be figured as an extra, or done on a special understanding by the hour, with a charge of 10 per cent. for the service.

For this locality the above price has proved correct and is the basis used for nearly all our leading contractors for several years past, being modified only by changes in the wage scale. The square foot is the most convenient unit of calculation and the price indicated will ordinarily afford a profit of 10 per cent. to the contractor if experienced workmen are put on the job.

The labor item divides about thus:

Laying the floor, per square foot .....	2 cents.
Scraping and sanding, per square foot .....	5 cents.
Total .....	<u>7 cents.</u>

To this amount add the cost of the material, including the necessary amount for matching and waste,



which will require one-third for 2 inch and one-fourth for 4-inch floor. This method of calculation may be best illustrated by a simple problem: "Figure the cost of furnishing, laying and finishing 2-inch quarter sawed yellow pine floor for a room 10x10 feet, the price of flooring being \$40 per thousand feet:"

100 square feet floor plus one-third for matching equals	
133 1-3 square feet, at 4 cents, or .....	\$5.33
Laying and scraping 100 square feet, at 7 cents.....	7.00
Filler and two coats varnish or wax, at 5½ cents per	
square foot .....	5.50
Total .....	<u>\$17.83</u>

Price per square foot, laid and finished complete, 18 cents.

We usually figure such a floor from 18 to 25 cents per square foot, according to conditions of the job, reserving the privilege of superintending the painter's work in order to ensure a good job. The Master Painters' shop scale for work of this character in this locality is 50 cents per square yard, being based on a wage scale of 35 cents per hour and a nine-hour day.

### **Efficiency of Workmen.**

As a matter of fact, more depends on the efficiency of the individual workman than on wage scale or hours of labor, and a little careful accounting on work under progress will enable the contractor to fix a satisfactory price. We prefer the square foot as the unit of calculation, as it affords an easy and rapid method of computation and it enables the contractor to give an estimate at once when called in on the job. It is essential of course that a definite table of prices be fixed beforehand, based on prices of materials and quality of work which prevail in the given locality.

The above prices for carpenter's and painter's work are ample for first-class work and will include the necessary materials for the painter's work. The figures above given are based on my personal observation and records of perhaps 50 different jobs covering a period of some five years, and compare closely with the experience of fellow contractors who have done business under the same conditions. I think they will be found sufficiently accurate for general use where similar conditions prevail. The proportions may be easily changed to suit any change in price of materials or labor.

A few further illustrations may serve to make this form of estimating clear to the reader.

Present prices at Missouri River points for hard wood flooring are as follows:

4-inch clear y. p., per 1000 feet .....	\$40.00
3-inch or 4-inch V. g., y. p., per 1000 feet .....	45.00
3/8 plain oak, 2-inch face, per 1000 feet .....	60.00
3/8 q. s. oak, 2-inch face, per 1000 feet .....	80.00
3/8 selected maple, 2-inch face, per 1000 feet .....	75.00

On the basis of these prices the calculation for furnishing 100 square feet of each variety of floor would be as follows:

4-inch y. p., at \$40 per 1000 feet:	
100 square feet (add 1/4), 125 feet, at 4 cents .....	\$5.00
Carpenter's labor, at 7 cents .....	7.00
Painter's labor, at 5 1/2 cents .....	5.50
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Total, 100 square feet .....	\$17.50
Price per square foot, complete, 17 1/2 cents.	
3-inch y. p., at \$45 per 1000 feet:	
100 square feet (add 1-3), 133 1-3 feet, at 4.5 cents .....	\$6.00
Carpenter .....	7.00
Painter .....	5.50
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Total, 100 square feet .....	\$18.50
Price per square foot, 18 1/2 cents.	

Plain oak, 2-inch face, at \$60 per 1000 feet:	
100 square feet (add 1-3), 133 1-3 feet, at 6 cents .....	\$8.00
Carpenter .....	7.00
Painter .....	5.50
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Total, 100 square feet .....	\$20.50
Price per square foot, 20½ cents.	

Quarter sawed oak, 2-inch face, at \$80 per 1000 feet:	
100 square feet (add 1-3), 133 1-3 feet, at 8 cents.....	\$10.67
Carpenter .....	7.00
Painter .....	5.50
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Total, 100 square feet .....	\$23.17
Price per square foot, 23.17 cents.	

Maple, 2-inch face, at \$75 per 1000 feet:	
100 square feet (add 1-3), 133 1-3 feet, at 7.5 cents .....	\$10.00
Carpenter .....	7.00
Painter .....	5.50
<hr/>	
Total, 100 square feet .....	\$22.50
Price per square foot, 22½ cents.	

The average customer will pay more in proportion for oak or maple than for pine and feel better satisfied, and the contractor will be fully justified in adding 10 per cent. to the estimated price for the 2-inch face thin flooring, inasmuch as it requires special care and considerable extra face nailing. The foregoing examples give a sufficient guide to the novice in estimating, so that individual calculations may be made, based upon any change in prices of materials and the work undertaken, with a reasonable expectation of profit.

### **Rough or Lining Floors.**

The estimates indicated above are based on the laying of the finished floor only and do not comprehend the laying of any under floor. If under floors or paper

lining between floors are required the additional cost should be computed and added to the estimate. We usually figure \$1.50 per 1000 feet for laying rough floors of common lumber or shiplap in a new building. If in an old building one must be governed entirely by the specific conditions, as no two cases are alike; as previously suggested, the safest practice is to do such work by the hour as an extra, charging 10 per cent. for the service.

**Floors Finished After Plaster.**

Should specifications require finishing floors after plastering add cost of two thicknesses of building paper to protect the floor and 50 per cent. extra to the carpenter labor in cleaning the floor. It is a fairly safe calculation to figure 10 cents per square foot for laying, protecting and finishing such floors, and at this apparently exorbitant price the contractor will not fare as well as on ordinary work. A fair example of this sort of work would be as follows:

“Compute cost, laid, protected with building paper, and finished after plaster of 4-inch y. p. floor at \$35 per 1000 feet, for a building 26 x 30 feet.”

26 × 30 = 780 square feet (add ¼), 975 feet, at 3.5 cents.	\$34.12
Carpenter, 780 feet at 10 cents .....	78.00
Total cost .....	\$112.12
Price per square foot, 14½ cents.	

To this must be added nails and painters' labor and materials. The price for the latter will vary somewhat, as a cheaper finish is customarily used on floors of this character. It will be seen, however, that wherever it is desired to have a finished floor it will pay to lay a

lining of common boards and not bring the finish floor into the building until plasterers are gone.

Parquetry, or inlaid floors, sometimes called wood carpet, are the highest type of art in wood work. They are made in great variety of patterns, usually composed of geometrical figures which adapt themselves readily to expression by means of straight lines, and a beautiful effect is secured by the joining of different colored woods.

These floors are now made in large factories specially equipped for the purpose, and their designers are among the highest paid class of art workers. The cost is determined by the intricacies of the pattern and the variety and rarity of the woods used. Inasmuch as the beauty of parquetry is dependent on color, it is not practical to illustrate it in the limits of this article. The reader who is interested in this style of work will do well to send for the manufacturers' catalogues.

The cost of laying parquetry floors is fixed largely by the character of the pattern and the shape of the room. The better plan is to furnish the factory with a plan of the room, drawn to scale and showing all angles, chimney projections at the floor line, etc., in order that the pattern may be made up to fit the outline of the room.

Parquetry is usually made up of a fancy border of parti-colored woods and a center, called "the field," composed of alternate strips about  $1\frac{1}{2}$  inches wide of contrasting varieties of wood. The sort in most common use is the thin variety, which is face nailed directly to the under floors with brads. The borders are glued to a soft wood backing and built up in squares so that they may be easily joined by any good mechanic.

Ordinary parquetry floor should bring twice as much for the labor of laying as plain hard wood floor, inas-



much as the small pieces composing the pattern require more frequent nailing and the exercise of unusual care for the entire job. Detailed instructions for laying are sent out with the stock from the factory, and no difficulty will be experienced by the workman if care is exercised.

The cost of finished parquetry is about the same as the more expensive grades of fine carpeting for the same space. The number of people of good taste who are giving preference to parquetry over carpets is constantly increasing, and an opening exists in every good sized town for the building up of a profitable specialty in laying and finishing this beautiful flooring material.